15. Quality Assurance

This section describes the tools available for science data Quality Assurance (QA) - the QA Monitor and the QA Metadata Update Tool (QAMUT) .

Operational Quality Assurance is performed by DAAC operations personnel authorized to modify the value of the Operational QA flag attribute value for a product generated at the DAAC. The operator has the capability to view the product through EOSView and retrieve production history files. Figure 15-1 provides an overview of the quality assurance process.
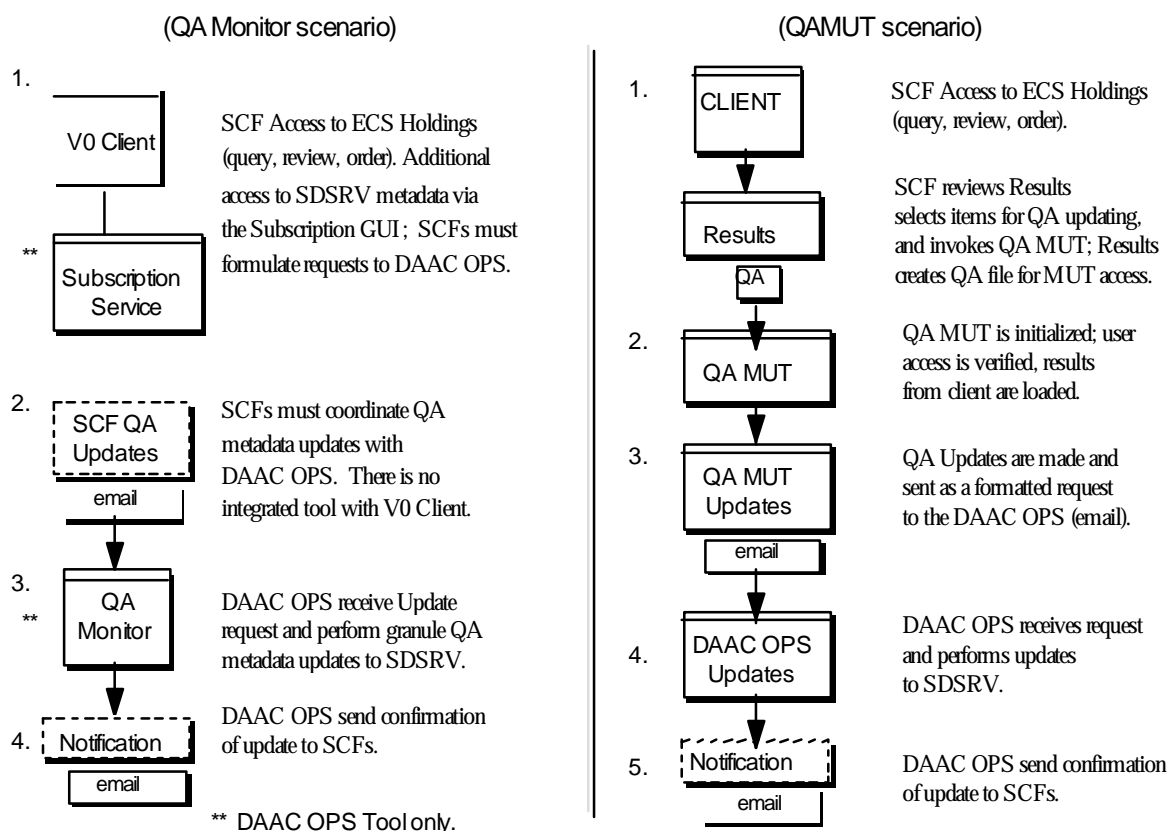

Figure 15-1. QA Metadata Update Process

15.1 QA Monitor

The purpose of the QA Monitor is to enable DAAC QA experts to modify ScienceQualityFlag and OperationalQualityFlag attributes of core metadata for a granule. SCFs send email requests to

the DAAC to update the ScienceQualityFlag attribute, until the QA Metadata Update Tool (Section 15.2) is available.

The QA Monitor can be used to request the Science Data Server to search for specific types of Data Granules; Query, Retrieve, and Update (QRU) Metadata; transfer Data Granules to the operator's computer; and transfer Production History to the operator's computer. It can also be used to update data granule metadata, view graphical images of data granules, and print/display lists of data granules and data types. Table 15.1-1 summarizes common operator functions performed with the QA Monitor. Table 15.1-2 describes the fields in the QA Monitor; Table 15.1-2 provides the usage for each of the pushbuttons.

The QA Monitor is launched by clicking on the Desktop Icon, or via Unix commands. The Unix commands are provided following Tables 15.1-1 through 15.1-3.

Table 15.1-1. Common Operator Functions Performed with the QA Monitor

Operator Function	Description	Purpose
Query Data Granules	Initiates a request to search the science archive for data granules	Find all archived data granules with the same data type which were inserted into the archive at a certain time (data interval)
Retrieve Data Granules	Initiates a request to get data granules from the science archive	Transfer data granule(s) from archive to local disk for visualization
Visualize Data (HDF files)	Display Visualize screen	View graphical image of data granules to assess quality
Update Metadata	Initiates a request to archive QA information about data granules	Update data granule QA information in the archive, based on DAAC QA activities encompassing use of the Visualize Data function.

Table 15.1-2. QA Monitor GUI Fields

Field Name	Data Type	Size	Entry	Description
Data Granule Insert Begin End	Date min max	1/2/1901 6/1/2036	Initial default value - can be changed by user	Search criteria for granule metadata beginning and end date
Data Types list	single selection	N/A	User selects a data type from the list displayed at startup	The list of all available data types at a specific DAAC
Data Granules list	multiple selection	N/A	User clicks data granule row(s) then clicks retrieve pushbutton	The list of all data granules in the date interval above for a particular selected data type are available for retrieval.
Status	text	N/A	Displays status messages only	Displays status messages

Table 15.1-3. QA Monitor GUI Pushbuttons

Button	Description
Query	Populates list of data granules on the bottom half of the GUI for a particular selected data type within a data interval
Find	(below the data types and data granules list) - allow the operator to perform a keyword search for information stored in those 2 lists.
Retrieve	Allows the operator to retrieve data granule(s) or production history tar file(s) from the DAAC's data archive and place on the local disk.
Update	Pops up a Granule Parameters screen Update Metadata Dialog

Launching the QA Monitor Using UNIX Commands

1   Access the command shell.
     The command shell prompt is displayed.

NOTE: Commands in Steps 2 through 14 are typed at a UNIX system prompt.

2   Type **xhost +** then press the **Return/Enter** key on the keyboard.

3   Open another UNIX window.

4   Start the log-in to the Data Processing Subsystem host by typing either **telnet** *hostname* (e.g., **g0sps06**), **rlogin** *hostname*, or **rsh** *hostname* in the new window then press the **Return/Enter** key.

     If you use the **telnet** command, a **Login:** prompt appears; continue with Step 5.
     If you use either the **rlogin** or **rsh** command, the system uses the User ID currently in use;
         go to Step 6.

5   If a **Login:** prompt appears, log in as yourself by typing your *UserID* then pressing the **Return/Enter** key.

6   At the **Password:** prompt type your *Password* then press the **Return/Enter** key.

7   Start the log-in to DCE by typing **dce_login** then pressing the **Return/Enter** key.

8   At the **Enter Principal Name:** prompt type your *DCE UserID* then press the **Return/Enter** key.

9   At the **Enter Password:** prompt type your *DCE Password* then press the **Return/Enter** key.

10   Type **setenv DISPLAY** *clientname***:0.0** then press the **Return/Enter** key.
Use either the terminal/workstation IP address or the machine-name for the *clientname*.

11   Type **setenv MODE** *mode*   then press the **Return/Enter** key.
The *mode* will most likely be one of the following operating modes:
      OPS (for normal operation).
      TS1 (for SSI&T).
      TS2 (new version checkout).
Note that the separate subdirectories under /usr/ecs apply to (describe) different operating
      modes.

12   Type **source /usr/ecs***mode***/CUSTOM/utilities/EcCoEnvCsh** then press **Return/Enter**.
The **source** command sets the environment variables identified in the specified file.

13   Type **cd /***path* then press **Return/Enter**.
Change directory to the directory (e.g., /usr/ecs*mode*/CUSTOM/utilities) containing the
      data processing start scripts (e.g., EcDpPrStartQaMonitorGUI).

14   Type **EcDpPrStartQaMonitorGUI** *mode ApplicationID &* then press **Return/Enter**
to launch the **QA Monitor** GUI.
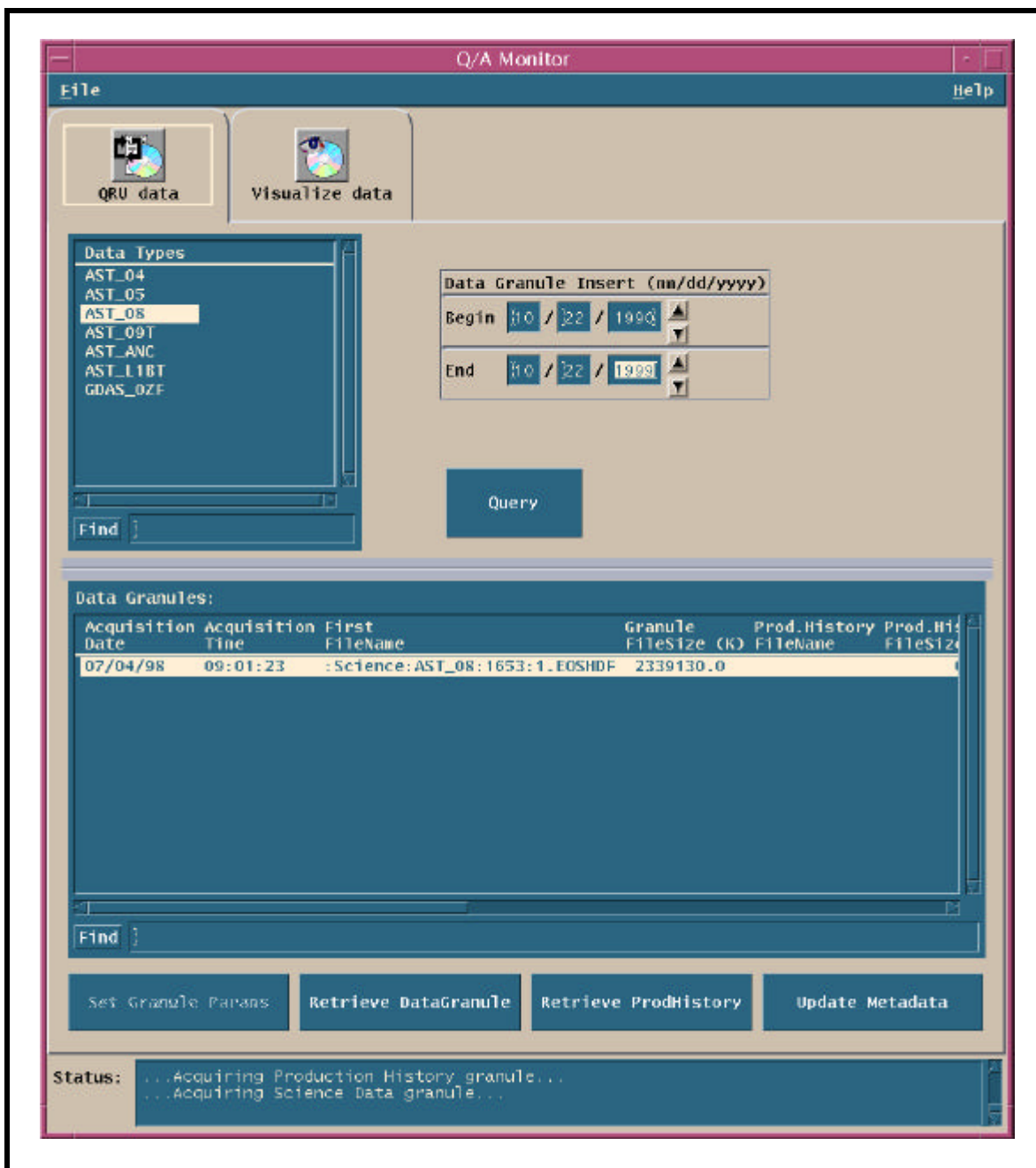The **QA Monitor** GUI (Figure 15-2) is displayed.

Figure 15-2. QA Monitor GUI - QRU Data Tab

15.1.1 DAAC Product QA with the QA Monitor

The Product QA process begins with the QA Monitor Application. The DAAC operations personnel will Query, Retrieve, and Update (QRU) the selected product. The operator will then

retrieve those specific products and perform a visual check of those products using the Visualize Data option of QA Monitor (Figure 15-3).

Retrieval and Viewing of Data Granules

1 Start up the QA Monitor

2 Select QRU Data tab.

3 From list of data types, select the ESDT or compose a query in query window and click on the **Query** button.

4 Select a data granule by filename from the list and click on the **Retrieve Data Granule** button.
    Quit the QA Monitor GUI.

5 To visualize the data, select the data granule as described above and click on the **Visualize Data** button.
    Displays EOS View GUI (Figure 15-3)

6 Open a HDF product file from which metadata is to be viewed, select the **File→ Open** button from the main menu bar.
    A **File Selection Dialog** window will open and the user should be able to select the appropriate directory and file to open.
    Once the desired product file has been opened, the specific types of HDF objects in the file will be listed in the **Contents** window.

7 From the **Contents** window double-click on a particular HDF Object (Vgroup, SDS, etc.).
    The structure of the HDF object will appear in a dialog window with buttons on the bottom portion of the window to view the data of the object itself.

8 Display the science data values of this particular HDF object by selecting the **Table** button to display the table data of the object.

9 View the attribute values of this particular HDF object by selecting the **File-Attribute** button.
    Metadata is referred to as **attribute data.**
    Any metadata associated with the object will be displayed in another text window.

10 Quit when done by typing **Q** then press the **Enter** key.
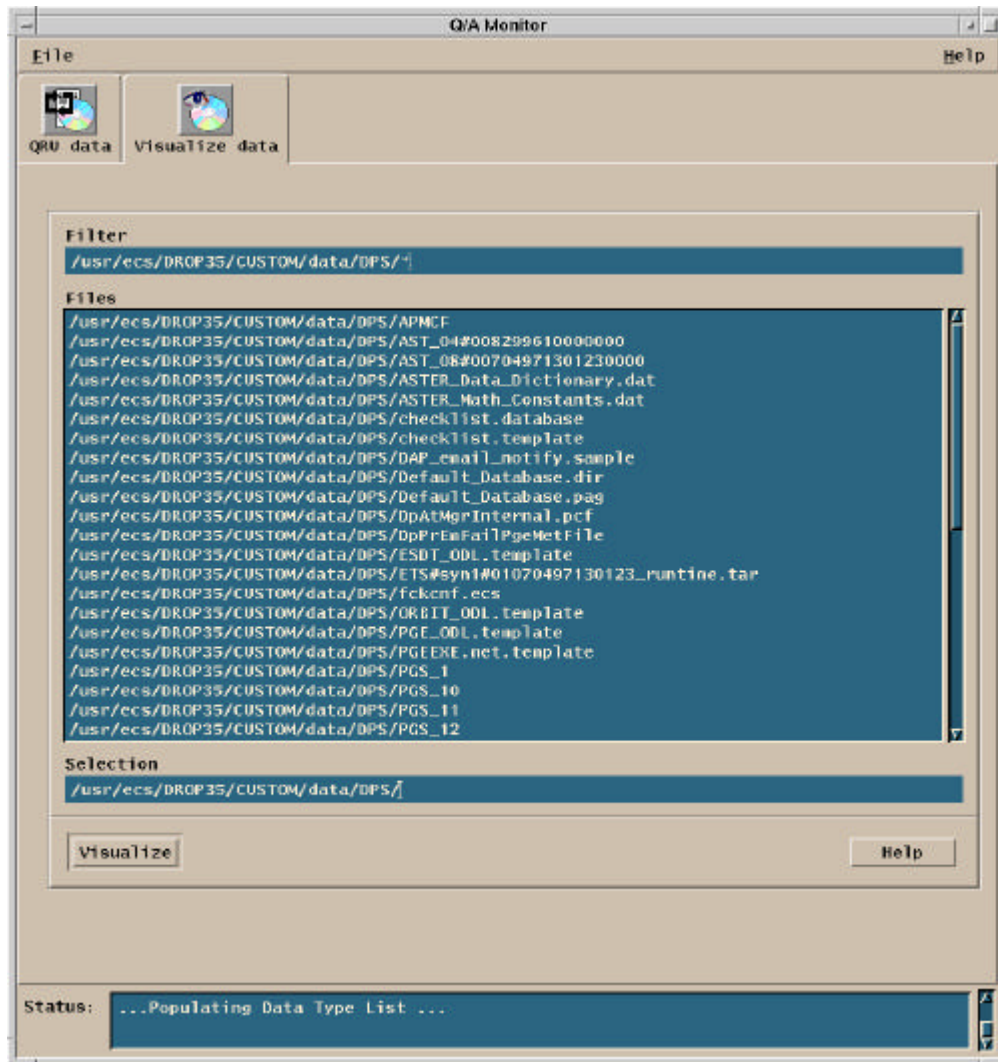
Visualize Data

Figure 15-3. QA Monitor - Visualize Data

15.1.2 Updating QA Metadata

After the viewing, the operator will update the Operational QA flag for that specific product. The operator also updates the Science QA flags in response to an email request from SCF personnel, who have the responsibility for performing QA of their own products.

This procedure for updating QA metadata starts with the assumption that all applicable servers are currently running and the **QA Monitor** GUI **QRU data** tab (Figure 15-4) is being displayed.

Table 15.1-4 summarizes the QA metadata attributes and their descriptions.

Table 15.1-4. QA Metadata Attributes

Field Name	Data Type	Description
OperationalQualityFlag ScienceQualityFlag	character	DAAC and SCF quality status setting of a data granule parameter, selected by the user. The valid values are: - passed - failed - being investigated - not investigated - inferred passed - inferred failed
OperationalQualityFlagExplanation ScienceQualityFlagExplanation	character	Text describing quality status (less than 255 characters), input by user.
AutomaticQualityFlag	character	DAAC and SCF quality status setting of a data granule parameter, set during data processing.
AutomaticQualityFlagExplanation	character	Text describing quality status of a data qranule parameter - set during data processing.

Updating Quality Assurance (QA) Metadata using the QA Monitor

1   In the **Data Types** field, click on the data type to be checked.
It may be necessary to scroll through the **Data Types** list.
The selected data type is highlighted.
Only one data type can be selected at a time.
Alternatively, the **Find** field and button can be used for specifying a data type.
        — The **Find** field is case-sensitive.
2   Click in the appropriate **Data Granule Insert** window field(s) and either type or use the up/down arrow buttons to enter the **Begin** date and **End** date in *MM/DD/YYYY* format.
In the **Data Granule Insert** window it is necessary to specify the range of dates (between the **Begin** date and the **End** date) to formulate a query for searching for the desired granule(s) to be checked. Time is based upon day of insert into the data server. If no dates are entered, an error message is displayed. The up and down arrows next to the duration fields may be used for modifying entries in each field.
The **Tab** key may be used to move from field to field.
3   Click on the **Query** button.
Granules within the specified date range appear in the **Data Granules** field.
4   In the **Data Granules** field, click on the granule for which metadata is to be updated.
It may be necessary to scroll through the list of granules.
The selected granule is highlighted.
Alternatively, the **Find** field and button may be used for specifying a data granule.
        — The **Find** field is case-sensitive.
5   Click on the **Update Metadata** button.
The Update Metadata window is displayed.

The Update Metadata window displays one line for each parameter for the selected granule.

6 Click on a parameter in the Update Metadata window.

The selected parameter is highlighted.

The Edit Parameter dialog box is displayed.

7 Click and hold on the **Operator Quality Flag** option button, move the mouse cursor to the desired selection (highlighting it), then release the mouse button.

The selected metadata flag is displayed on the **Operator Quality Flag** option button.

The following options are available:

— **passed**
— **failed**
— **being investigated**
— **not investigated**
— **inferred passed**
— **inferred failed**

8 Type an explanation for changing the QA flag value in the **Explanation** field.

9 Click and hold on the **SCF Quality Flag** option button, move the mouse cursor to the desired selection (highlighting it), then release the mouse button.

The selected metadata flag is displayed on the **SCF Quality Flag** option button.

The same options are available as those on the **Operator Quality Flag** option button.

10 Type an explanation of the QA flag selection in the **Explanation** field.

11 Click on the **OK** button to accept the QA flag settings.

The Edit Parameter dialog box is dismissed.

12 To verify that the QA flag settings have actually been applied to the granule, first repeat Steps 1 through 5 to retrieve the same granule.

The **Granule Parameters** window (Figure 15-4) is displayed.

The QA flag values and explanations entered using the Edit Parameter dialog box are displayed.

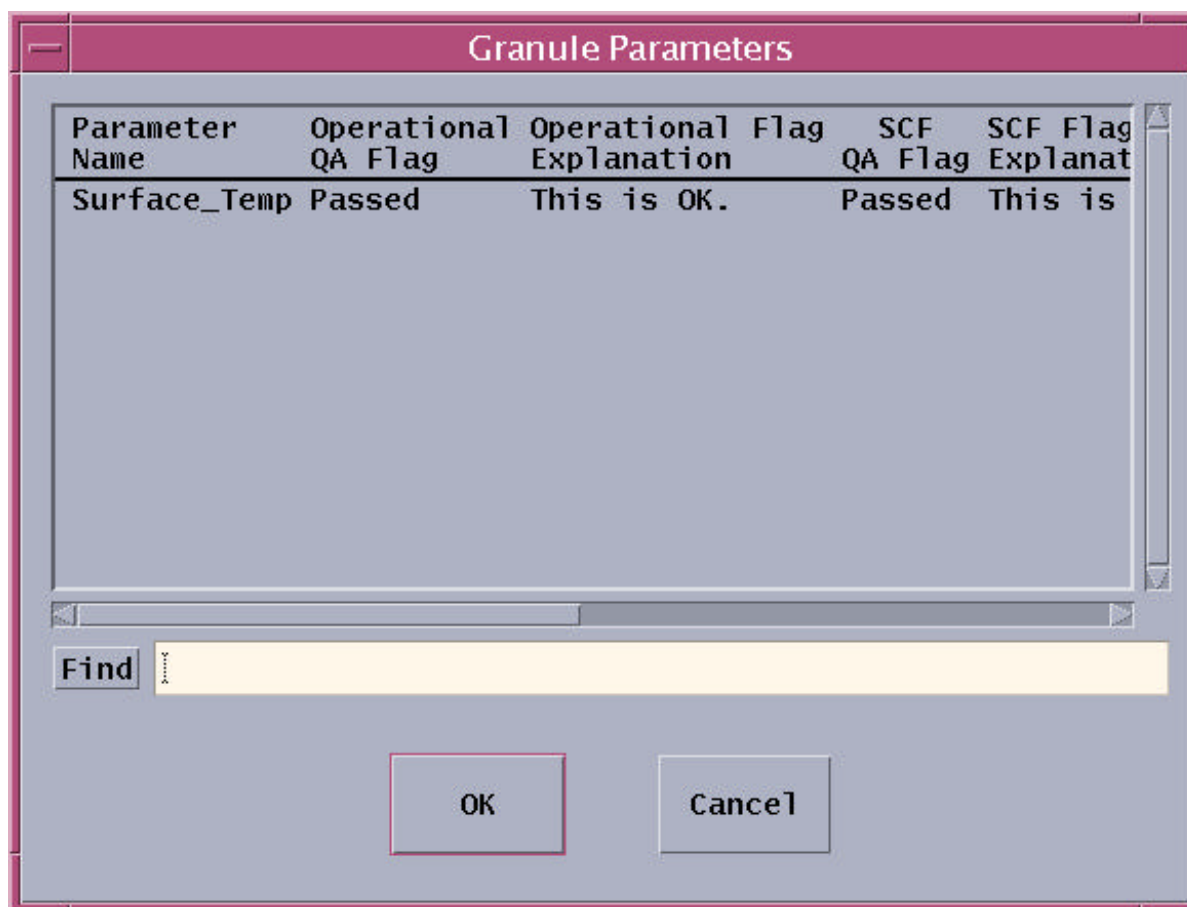**13** Repeat steps as necessary to review additional granules.

Figure 15-4. QA Monitor Granule Parameters Window

15.1.3 Production History

The Production History (PH) is created during PGE execution within the PDPS and then Inserted into the Data Server upon PGE completion. Included in the PH are the PGE log files. Accessing a Production History associated with a particular PGE run requires the DPR ID of the PGE run.

The Production History is retrieved using the QA Monitor GUI, using the following procedure.

> Follow the procedures above for selecting a data granule.

- Select the **Retrieve ProdHistory** button and view the contents of the **Production History Log**.

15.2 QA Metadata Update Tool

The purpose of the QA Metadata Update Tool (QAMUT) is to enable Science Computing Facility (SCF) and Distributed Active Archive Center (DAAC) QA experts to modify values of their respective quality flags (i.e., ScienceQualityFlag and OperationalQualityFlag) on core

metadata, provided via a client, for multiple granules at a time in a batch mode (vs. one granule at a time using the QA Monitor). At the time of this writing, each DAAC plans to utilize either an existing client at the DAAC or develop a client to search the metadata holdings at the DAAC. It is anticipated that DAACs will integrate the client with QAMUT software developed by the ECS project and provided to DAACs. The integrated client and QAMUT software will provide complete tools to perform quality assurance updates on metadata. The detailed implementation plans for QAMUT at the DAACs, if any, are not known at this time.

The QAMUT tool itself consists of two major components: The SCF component (for updating ScienceQualityFlags) and the DAAC component (for updating OperationalQualityFlags). The QAMUT is fully documented in the following white paper: QA Metadata Update Tool for the ECS Project, April 1998 (160-WP-002-001).

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